



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/823,371	04/12/2004	Steven C. Shannon	8824/ETCH/DRIE	4850

55649 7590 10/10/2007  
MOSER IP LAW GROUP / APPLIED MATERIALS, INC.  
1030 BROAD STREET  
2ND FLOOR  
SHREWSBURY, NJ 07702

EXAMINER
----------

ARANCIBIA, MAUREEN GRAMAGLIA

ART UNIT	PAPER NUMBER
----------	--------------

1792

NOTIFICATION DATE	DELIVERY MODE
-------------------	---------------

10/10/2007

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ATABOADA@MOSERIPLAW.COM  
DOCKETING@MOSERIPLAW.COM

## Office Action Summary

Application No.

10/823,371

Applicant(s)

SHANNON ET AL.

Examiner

Maureen G. Arancibia

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 16 September 2007 and 17 September 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,3-10 and 12-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,3-10 and 12-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 March 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609.04(a) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

### ***Continued Examination Under 37 CFR 1.114***

2. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 16 September 2007 has been entered.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. **Claims 1, 3, 4, 6, 7, 9, 10, 12-15, and 17-20 are rejected under 35 U.S.C.**

**103(a) as being unpatentable over Japanese Kokai 08-097199A to Nishiyama et al.**

Art Unit: 1763

**in view of Japanese Kokai 06-243992 to Deguchi et al. The following rejection refers to the Figures and English Machine Translations of Nishiyama et al. and Deguchi et al.**

Nishiyama et al. teaches an apparatus for matching the impedance of a pair of RF sources 16, 17 coupled to a single electrode 15 to the impedance of a plasma in a semiconductor substrate processing chamber 11 (EMT, Paragraph 12), comprising: a first sub-circuit 18 for matching the impedance of a first RF signal *having a variable frequency* (EMT, Paragraph 12) of between about 13.56 MHz to 40 MHz (EMT, Paragraph 19) generated by a first RF source 16 to the impedance of the plasma; and a second sub-circuit 19 for matching the impedance of a second RF signal *having a variable frequency* (EMT, Paragraph 12) of between about 10 kHz to 1 MHz (EMT, Paragraphs 20-21) generated by a second RF source 17 to the impedance of the plasma, the second sub-circuit connected to the first sub-circuit to form a common output that is coupled to the electrode 15. (Figure 1) Note that the ranges in frequency for the first and second RF signals as taught by Nishiyama et al. overlap with the claimed ranges, and thus meet the limitations as recited in the claims.

Further note that Nishiyama et al. teaches that the first and second RF sources 16, 17, are variable frequency power sources (*RF generators 16 and 17 of two variable frequencies*; Paragraph 12), and thus are structurally capable of both being simultaneously set to frequencies in the claimed ranges. It has been held that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959).

Also, a claim containing a “recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus” if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)

In regards to Claim 19, Nishiyama et al. does not teach that the first and second sub-circuits are structured such that a first match tune space defined by the first sub-circuit can be varied without affecting a second match tune space defined by the second circuit. Further in regards to Claims 1, 3, 9, 10, 12, and 20, Nishiyama et al. does not expressly teach the claimed features of the first and second matching sub-circuits.

Deguchi et al. teaches that a matching circuit 14 for a variable frequency RF source 12 should comprise a fixed set of series components and a variable shunt capacitor 22 connected to ground. (Figure 1 ; EMT, Paragraphs 13-16)

It would have been obvious to one of ordinary skill in the art to modify each of the first and second matching sub-circuits for variable frequency RF sources 16, 17 taught by Nishiyama et al. to each comprise a matching sub-circuit having a fixed set of series components and a variable shunt capacitor, as taught by Deguchi et al. The motivation for making such a modification to each sub-circuit, as taught by Deguchi et al. (English Machine Translation, Paragraphs 11, 19, 20, 30, and 31), would have been that the combination of such a matching sub-circuit with a variable frequency RF source allows the impedance of the RF signal to be matched to the impedance of the plasma quickly with fewer variable capacitors and overall smaller equipment size by varying the

Art Unit: 1763

frequency of the RF signal generated by the RF source and by varying the shunt capacitance.

Further in regards to Claims 1, 3, 9, 10, 12, 19, and 20, the apparatus taught by the combination of Nishiyama et al. and Deguchi et al. meets all of the structural limitations of the claimed invention, and would be structurally capable of performing the intended use of allowing the first match tune space defined by the first sub-circuit to be varied without substantially affecting the second match tune space defined by the second sub-circuit, by varying the variable shunt capacitors. (The Examiner refers to Paragraphs 20 and 21 of the instant Specification, which disclose that this intended use is performed in the manner just described as capable of being performed by the apparatus taught by the combination of Nishiyama et al. and Deguchi et al.) It has been held that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). Also, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)

In regards to Claims 4 and 13, the match tune spaces of the first and second RF sources taught by the combination of Nishiyama et al. and Deguchi et al. would be structurally capable of being controlled by varying the frequency of the signal generated by one of the first and second RF sources taught by Nishiyama et al., which are variable

Art Unit: 1763

RF sources as discussed above in regards to Claim 19. It has been held that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). Also, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)

In regards to Claims 6 and 14, the first and second sub-circuits taught by the combination of Nishiyama et al. and Deguchi et al. would be structurally capable of being fixed in a predetermined configuration prior to performing a process in the chamber, based on user control of the variable shunt capacitors and variable RF sources. It has been held that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). Also, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)

In regards to Claims 7 and 15, the apparatus taught by the combination of Nishiyama et al. and Deguchi et al. would be structurally capable of matching the impedance of the first and second RF sources to the impedance of the processing chamber during processing by varying at least one of the variable shunt capacitors of

Art Unit: 1763

the first and second sub-circuits as taught by the combination of Nishiyama et al. and Deguchi et al. or by varying the frequency of at least one of the first and second RF sources taught by Nishiyama et al., which are variable RF sources as discussed above in regards to Claim 19. It has been held that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). Also, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987)

In regards to Claims 17 and 18, see the discussion of Claim 19 above.

**5. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiyama et al. in view of Deguchi et al. as applied to Claim 1 above, and further in view of U.S. Patent 6,887,339 to Goodman et al.**

The teachings of Nishiyama et al. and Deguchi et al. were discussed above.

The combination of Nishiyama et al. and Deguchi et al. does not expressly disclose the output impedance of the first and second RF sources.

Goodman et al. teaches that RF sources conventionally have a 50 Ohm output impedance. (Column 1, Lines 57-59)

It would have been obvious to one of ordinary skill in the art to use RF sources with a 50 Ohm output impedance, as taught by Goodman et al., in the apparatus taught



by Nishiyama et al. and Deguchi et al. The motivation for doing so would have been to assemble the apparatus using standard (readily available) components.

**6. Claims 8 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nishiyama et al. in view of Deguchi et al. as applied to Claims 1 and 10 above, and further in view of U.S. Patent 6,642,149 to Suemasa et al.**

The teachings of Nishiyama et al. and Deguchi et al. were discussed above.

In regards to Claims 8 and 16, the combination of Nishiyama et al. and Deguchi et al. does not expressly teach the claimed isolation sub-circuit.

Suemasa et al. teaches isolation sub-circuits 118, 124 for preventing power supplied from either of the first and second RF sources 122, 128 from being coupled to the other of the first and second RF sources. (Column 4, Lines 1-3 and 11-13)

It would have been obvious to one of ordinary skill in the art to modify the apparatus taught by the combination of Nishiyama et al. and Deguchi et al to include isolation sub-circuits, as taught by Suemasa et al. The motivation for making such a modification, as taught by Suemasa et al. (Column 4, Lines 1-3 and 11-13), would have been to preventing power supplied from either of the first and second RF from being coupled to the other of the first and second RF sources.

#### ***Response to Amendment***

7. The declaration under 37 CFR 1.132 filed 17 September 2007 is insufficient to overcome the rejection of Claims 1, 3-10, 12-18, and 20 based upon the combination of Nishiyama et al. and Deguchi et al. (and further in combination with Goodman et al. as

Art Unit: 1763

regards Claim 5, and further in combination with Suemasa et al. as regards Claims 8 and 16) as set forth in the last Office action because:

The declaration attempts to show that fixed series elements in the respective tuning portions of a dual frequency match circuit do not *necessarily* provide respective tune space independence. As evidence, the declaration cites a Smith chart illustrating the divergent tune space graphs predicted by a modeling analysis for a dual frequency match circuit having fixed series components and a variable shunt to ground "*that does not comport with the principles of the present invention.*"

The declaration is insufficient to overcome the rejections based upon the combination of Nishiyama et al. and Deguchi et al. at least for several reasons. First, it refer(s) only to the system described in the above referenced application and not to the individual claims of the application. Thus, there is no showing that the objective evidence of nonobviousness is commensurate in scope with the claims. See MPEP § 716.

Further, an affidavit or declaration under 37 CFR 1.132 must compare the claimed subject matter with the closest prior art to be effective to rebut a *prima facie* case of obviousness. *In re Burckel*, 592 F.2d 1175, 201 USPQ 67 (CCPA 1979). "A comparison of the claimed invention with the disclosure of each cited reference to determine the number of claim limitations in common with each reference, bearing in mind the relative importance of particular limitations, will usually yield the closest single prior art reference." *In re Merchant*, 575 F.2d 865, 868, 197 USPQ 785, 787 (CCPA 1978) (emphasis in original). Where the comparison is not identical with the reference

Art Unit: 1763

disclosure, deviations therefrom should be explained, *In re Finley*, 174 F.2d 130, 81 USPQ 383 (CCPA 1949), and if not explained should be noted and evaluated, and if significant, explanation should be required. *In re Armstrong*, 280 F.2d 132, 126 USPQ 281 (CCPA 1960) (deviations from example were inconsequential). See MPEP § 716.02(e).

Rather than comparing the claimed subject matter with the closest prior art, the declaration compares the disclosed invention with a “proprietary Applied Materials, Inc. parallel lump element match circuit.” The declaration does not explain the deviations between the proprietary match circuit (the details of which, it should be noted, are therefore unavailable to Examiner due to the proprietary nature of the cited apparatus) and the cited prior art. It is impossible to determine from the information provided in the declaration whether the demonstration of a dual frequency match circuit that does not have respective tune space independence is relevant to the grounds of rejection set forth in the prior and the instant office actions.

Finally, the declaration attempts to show that a dual frequency match circuit having fixed series components and a variable shunt to ground does not necessarily or inherently exhibit respective tune space independence. However, the rejection is based on the *structural capability* of the apparatus of the combination of Nishiyama et al. and Deguchi et al. to perform in the same manner as the claimed invention, based on the user control of the variable shunt capacitors and the variable RF sources. The declaration is silent as to why the apparatus of the combination of Nishiyama et al. and

Deguchi et al. would not be *structurally capable* of exhibiting the respective tune space independence of the claimed invention.

***Response to Arguments***

8. Applicant's arguments filed 16 September 2007 have been fully considered but they are not persuasive.

In regards to applicant's argument that Nishiyama et al. does not teach first *and* second RF signals having frequencies both within the claimed ranges, examiner must respectfully disagree. Nishiyama et al. expressly teaches that the first and second RF sources are *variable frequency* power sources, as discussed above. The frequency ranges for each power source as taught by Nishiyama et al. overlap with the claimed ranges. Thus, both power sources would be structurally capable of both being simultaneously set to frequencies in the claimed ranges. It has been held that claims directed to apparatus must be distinguished from the prior art in terms of structure rather than function. *In re Danly*, 263 F.2d 844, 847, 120 USPQ 528, 531 (CCPA 1959). Also, a claim containing a "recitation with respect to the manner in which a claimed apparatus is intended to be employed does not differentiate the claimed apparatus from a prior art apparatus" if the prior art apparatus teaches all the structural limitations of the claim. *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987) That Nishiyama et al. teaches a specific example, as argued by applicant, wherein when the second RF source has a frequency within the claimed range, the first RF source has a frequency outside of the claimed range (i.e. Paragraphs 20-21 of Nishiyama et al.), does not obviate the fact that the first and second RF sources are *variable frequency*

Art Unit: 1763

*power sources*, and could also be set to simultaneously both have frequencies within the claimed range. Therefore, it also follows that Nishiyama et al. teaches first and second sub-circuits that are capable of matching the impedances of RF signals having frequencies within the claimed ranges.

In regards to applicant's arguments against the combination of Nishiyama et al. and Deguchi et al., examiner has responded above to the declaration under 37 C.F.R. 1.132, upon which applicant relies. It is also noted that the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

In response to applicant's arguments against the references individually, particularly that Deguchi et al. only teaches a single RF power supply and a single matching part, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

### **Conclusion**

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Maureen G. Arancibia whose telephone number is (571)

Art Unit: 1763

272-1219. The examiner can normally be reached on core hours of 10-5, Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Parviz Hassanzadeh can be reached on (571) 272-1435. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Maureen G. Arancibia  
Patent Examiner  
Art Unit 1763



Parviz Hassanzadeh  
Supervisory Patent Examiner  
Art Unit 1763